NOTES ON FIRE PROTECTION[1]

By T. N. Hooper[2]

In the year 1914 there were 406 actual fires in the city of Davenport. In the year 1913 there were 370, so that it is safe to say there is an average of one fire per day. It is the business of the water department to be prepared to drown out any fire at any point in the city at any moment and without delay. It is therefore plain that a proper water works system must be prepared and equipped with all necessary intakes, pumping machinery, mains and appurtenances required for fire protection. Few outside persons realize the large part of the total investment in a well designed water works that is required solely to meet the fire demand.

Just a few words in regard to the design and operation of a water works system with especial reference to fire protection. Water works installations are not built as a whole; they are a matter of growth and they grow with the town. When the first mains are laid out, it is not known where the principal hazards will grow up in later years so that oftentimes mains are laid that are too small. Later these have to be reinforced with larger pipes. Extensions are continually being carried out in the outlying districts, radiating like the fingers of the hand. These extensions need tying together and must be gradually brought into a system. One of the greatest difficulties is to maintain a proper percentage of large mains. Each year small mains are laid for extensions and under ordinary circumstances the laying of larger mains, as feeders, is deferred.

In Davenport there are today 98.14 miles of mains. Of this 23 per cent are of sizes 12 inches and over; only 3.6 per cent are under 6 inches in size. The present practice is to lay no mains smaller than 8-inch diameter in important districts and no mains are laid at all under 6-inch diameter. In 1909 there were 5 miles of 4-inch pipe in Davenport—today there are 3½ miles. Some 4-inch

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[2] Vice-President, Davenport Water Company, Davenport, Iowa.

is taken up every year and it is proposed to remove it all. Large mains are not necessary to supply consumers with water, but they must be there to furnish the proper quantities for fire extinction at any time, even if they are not called upon to do so for many years in succession. When small mains are crossed by mains of larger size, it is the practice to remove fire hydrant on intersection where the cross occurs and to set the hydrant on the larger size main. In this way, after a time, very few hydrants are found on small mains in important districts.

The commercial district of Davenport extends from Rock Island Street to Scott Street and from Front Street to Fourth Street, embracing eighteen city blocks. These blocks are approximately 400 feet square. Through this district there are three 16-inch mains laid parallel and one 8-inch main. The four mains mentioned are cross connected by two 16-inch mains; two 12-inch mains; two 8-inch mains, and one main partly 8-inch and partly 6-inch. Throughout this district there are but two blocks having 6-inch pipe and but one block on which there is no pipe. Feeding this gridiron there are three mains from the pumping station 1½ miles distant, one 14-inch, one 16-inch and one 24-inch. In addition to this there is a 16-inch main which may be used to supply water from the pumping station at elevated storage reservoir 179 feet above datum and 1 mile away. This reservoir pumping station supplies high level residence district by direct pumping, taking suction from the storage reservoir. When there is a large fire on lower level, the changing of two gate valves allows pumping down hill through the supply main, giving a pressure of 100 pounds in the commercial district when carrying 40 pounds at the station.

There is not space in a short paper to describe the principal features of an ideal plant, but it is believed that the principal fault in the present practice in many cities is that mains are laid that are too small and these small mains are not thoroughly connected. The advantage in having mains of ample size is that the excessive pressures oftentimes carried at pumping stations are avoided. Also, when large quantities are required at some point in the distribution system they can be supplied from the pumping station without creating high velocities in any mains.

It has always been the practice in Davenport to place a gate valve on the branch supplying each hydrant. It is never necessary to shut off mains in order to make repairs to fire hydrants. Another

practice which has proved to be wise and economical is frequent inspection of fire hydrants in cold weather. Every fire hydrant, and there are 924 altogether, is inspected at least once a week in cold weather, and in very severe weather twice a week. It is known at all times that the caps are free and can easily be taken off by the fire department. A pump with suction hose is used to prove that there is no water in the barrel of the hydrant. Theoretically, every hydrant is tight as to its main valve and no one is supposed to use it in cold weather. Practically, main valves are not always tight and oftentimes there is ground water which enters the hydrant barrel through waste outlet, and again, unauthorized persons will open hydrants occasionally. It is better to know of these things than to discover them during the time of a fire. It is the experience of all water works operators that the main difficulty in keeping fire hydrants ready for service is the failure to confine the use of hydrants to the experienced firemen and water works employees.

Another precaution observed in our plant is the practice of sending men to every fire whether night or day and at second alarm fires, everyone is called who can be of any assistance. The superintendent is found at the main pumping station where there are duplicate telephones which may be used to control pumping in the other pumping station. The assistant superintendent is always on duty at the fire, and other men, with automobiles and tools, are prepared to answer any calls instantly. Each man has his place; each man knows where the others may be found.

During the past two years all hydrants set have standard $4\frac{1}{2}$-inch steamer nozzles as well as the usual two $2\frac{1}{2}$ inch nozzles. Davenport has no steamer or pumping machine, and may not have for many years, but should the time come when it is necessary or desirable to use fire department pumping apparatus, the hydrants will be prepared for it. No hydrants having less than 7-inch barrels, 5-inch valve openings and 6-inch connection to the mains have been set for several years. There is no hydrant having connection to the main less than 5 inches diameter or having barrel less than $5\frac{3}{4}$ inches.